

Process Specification for Baking Materials to Reduce Toxic Offgassing

Engineering Directorate

Structural Engineering Division

June 2005



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

Process Specification for Baking Materials to Reduce Toxic Offgassing

Prepared by: *Signature on file* 6/10/05
Michael D. Pedley
Manufacturing, Materials, and
Process Technology
Division/ES4
Date

Approved by: *Signature on file* 6/10/05
Bradley Files, Chief
Materials and Processes
Branch /ES4
Date

REVISIONS		
VERSION	CHANGES	DATE
Baseline	Original version	4/11/00
Revision A	Administrative changes only	5/5/03
Revision B	Minor change to explicitly permit bakeout to be broken up into multiple sessions	6/10/05

1.0 SCOPE

This process specification defines the JSC process for baking hardware to reduce the offgassing of trace gas contaminants.

2.0 APPLICABILITY

This specification applies to the baking of hardware, whenever baking is required to meet toxic offgassing requirements. Baking is required only when the toxic hazard index (T) value exceeds 0.5. [When multiple items with essentially the same design are flown (such as multiple Cargo Transfer Bags in several different sizes), the T value must be less than 0.5 for the total number of hardware items on orbit at the same time.]

For Nomex HT9040 fabric, the T value exceeds 0.5 in a volume of 65 m³ (Space Shuttle orbiter or ISS Unity Node) when the quantity exceeds 217 lb.; allowable quantities for other materials can be obtained from JSC M&P.

3.0 USAGE

This process specification shall be called out on the engineering drawing by a drawing note with the following general format:

BAKE FABRICATED HARDWARE PER NASA/JSC PRC-9010.

4.0 REFERENCES

All documents listed are assumed to be the current revision unless a specific revision is listed.

NASA-STD-6001	Flammability, Odor, Offgassing, and Compatibility Requirements and Test Procedures for Materials in Environments that Support Combustion
PRC-5001	Process Specification for Cleaning and Descaling

The following references were used in developing this process specification:

SOP-007.2	Preparation and Revision of Process Specifications
JPG 8500.4	Engineering Drawing System Manual

5.0 MATERIALS REQUIREMENTS

None identified.

6.0 PROCESS REQUIREMENTS

6.1 Bakeout Oven

All hardware bakeout shall be conducted in an oven with active ventilation. The ventilation system shall provide a minimum of 4 air exchanges per hour within the oven. The room containing the oven is an acceptable source of air. All oven interior surfaces shall be cleaned and verified to be visibly clean per PRC-5001 before introduction of flight hardware. Any solvents used in the cleaning process shall be removed before introduction of the flight hardware.

6.2 Bakeout Conditions

Hardware shall be hanged in the oven without direct contact with oven surfaces. Space shall be left between hardware items to ensure adequate air circulation; contact between hardware items shall be minimal. All hardware shall be baked for 48 hours at 120 °F unless different conditions are specified on the engineering drawing. The bakeout may be continuous or broken up into two or more separate periods, provided the total bakeout time at temperature is at least 48 hours (or a different time specified on the engineering drawing).

7.0 PROCESS QUALIFICATION

Process qualification is not required. However, work instructions shall be generated for implementing this process specification. The work instructions shall contain sufficient detail to ensure that the manufacturing process produces consistent, repeatable products that comply with this specification.

8.0 PROCESS VERIFICATION

Verification of oven temperatures shall be accomplished by recording the temperatures on strip charts or other suitable hard copy recordings. Temperature charts shall be maintained with the hardware's work order router package.

Process verification is required only when a new material is processed. After the hardware bakeout is complete, a representative hardware item shall be tested for toxic offgassing per NASA-STD-6001 to verify the T value is now within specification. If the hardware fails the verification, it may be rebaked under the same conditions or for a longer time/higher temperature.

9.0 TRAINING AND CERTIFICATION OF PERSONNEL

All baking treatments shall be performed by personnel qualified to conduct the process through training or experience.

10.0 DEFINITIONS

Toxic Offgassing The evolution of potentially toxic gaseous products from a liquid or solid material into an atmosphere